WHAT IS CLAIMED IS:

1. An image processing apparatus wherein a first processing circuit and a second processing circuit are connected in m bits, the apparatus comprising:

5   replacement means for replacing lower n bits of an m-bit image signal with n-bit additional information, and outputting an m-bit conversion image signal;

error calculation means for calculating an error between the m-bit conversion image signal replaced by

10   the replacement means and the m-bit image signal before the replacement;

an error buffer for storing the error calculated by the error calculation means;

weight coefficient storage means for prestoring

15   a weight coefficient for calculating a weight error;

weight error calculation means for calculating a weight error by multiplying the error stored in the error buffer by the weight coefficient stored in the weight coefficient storage means;

20   error correction means for correcting the m-bit image signal before the replacement, using the weight error calculated by the weight error calculation means; and

extraction means for extracting the lower n bits

25   of the m-bit conversion image signal replaced and output from the replacement means.

2. An image processing apparatus according to

claim 1, wherein the m-bit conversion image signal is only a specific color component of color-separated color image signals.

3. An image processing apparatus according to claim 1, wherein the m-bit image signal before the replacement is a color difference component of a color image signal represented by a luminance and a color difference.

4. An image processing apparatus wherein a first processing circuit and a second processing circuit are connected in m bits, the apparatus comprising:

multi-value means for subjecting an m-bit image signal to a multi-value process and converting the m-bit image signal to an m-n bit image signal;

error calculation means for calculating an error between the m-n bit image signal multi-value-processed by the multi-value means and the m-bit image signal before subjected to the multi-value process;

an error buffer for storing the error calculated by the error calculation means;

weight coefficient storage means for prestoring a weight coefficient for calculating a weight error;

weight error calculation means for calculating a weight error by multiplying the error stored in the error buffer by the weight coefficient stored in the weight coefficient storage means;

error correction means for correcting the m-bit

image signal before the multi-value process, using the weight error calculated by the weight error calculation means;

addition means for adding n-bit information to the m-n bit image signal multi-valued-processed by the multi-value means, and outputting an m-bit conversion image signal;

first extraction means for extracting information bits of n bits from the m-bit conversion image signal output from the addition means; and

second extraction means for extracting image bits of m-n bits from the m-bit conversion image signal output from the addition means.

5. An image processing apparatus wherein a first processing circuit and a second processing circuit are connected in m bits, the apparatus comprising:

first replacement information pixel determination means for specifying n pixels within j X k pixels;

replacement means for replacing, where the first replacement information pixel determination means has determined that process target pixels are specific n pixels, specific bits of an m-bit image signal with specific bits of n-bit additional information, and outputting an m-bit conversion image signal;

second replacement information pixel determination means for specifying n pixels within j X k pixels; and

information bit extraction means for extracting,

where the second replacement information pixel
determination means has determined that process target
pixels are specific n pixels, specific bits of the
m-bit conversion image signal output from the
replacement means, and reconstructing information bits
of n bits within the j X k pixels.

6. An image processing apparatus wherein a first
processing circuit and a second processing circuit are
connected in m bits, the apparatus comprising:

first replacement information pixel determination
means for specifying n pixels within j X k pixels;

replacement means for replacing, where the first
replacement information pixel determination means has
determined that process target pixels are specific n
pixels, specific bits of an m-bit image signal with
specific bits of n-bit additional information, and
outputting an m-bit conversion image signal;

error calculation means for calculating an error
between the m-bit conversion image signal replaced by
the replacement means and the m-bit image signal before
the replacement;

an error buffer for storing the error calculated
by the error calculation means;

weight coefficient storage means for prestoring
a weight coefficient for calculating a weight error;

weight error calculation means for calculating
a weight error by multiplying the error stored in the

error buffer by the weight coefficient stored in the weight coefficient storage means;

error correction means for correcting the m-bit image signal before the replacement, using the weight error calculated by the weight error calculation means;

second replacement information pixel determination means for specifying n pixels within j × k pixels; and

information bit extraction means for extracting, where the second replacement information pixel determination means has determined that process target pixels are specific n pixels, specific bits of the m-bit conversion image signal replaced and output from the replacement means, and reconstructing information bits of n bits within the j × k pixels.

7. An image processing apparatus wherein a first processing circuit and a second processing circuit are connected in m bits, the apparatus comprising:

first replacement information pixel determination means for specifying n pixels within j × k pixels;

replacement means for replacing, where the first replacement information pixel determination means has determined that process target pixels are specific n pixels, lower n bits of an m-bit image signal with n-bit additional information, and outputting an m-bit conversion image signal;

error calculation means for calculating an error between the m-bit conversion image signal replaced by

the replacement means and the m-bit image signal before the replacement;

an error buffer for storing the error calculated by the error calculation means;

5   weight coefficient storage means for prestoring a weight coefficient for calculating a weight error;

weight error calculation means for calculating a weight error by multiplying the error stored in the error buffer by the weight coefficient stored in the

10   weight coefficient storage means;

error correction means for correcting the m-bit image signal before the replacement, using the weight error calculated by the weight error calculation means;

second replacement information pixel determination

15   means for specifying n pixels within j × k pixels; and

extraction means for extracting, where the second replacement information pixel determination means has determined that process target pixels are specific n pixels, the lower n bits of the m-bit conversion image

20   signal replaced and output from the replacement means.

8.   An image processing apparatus wherein a first processing circuit and a second processing circuit are connected in l bits, the apparatus comprising:

multi-value means for subjecting an m-bit image

25   signal to a multi-value process and converting the m-bit image signal to an l-n (n < l < m) bit image signal;

error calculation means for calculating an error between the 1-n bit image signal multi-value-processed by the multi-value means and the m-bit image signal before subjected to the multi-value process;

5   an error buffer for storing the error calculated by the error calculation means;

weight coefficient storage means for prestoring a weight coefficient for calculating a weight error;

weight error calculation means for calculating

10   a weight error by multiplying the error stored in the error buffer by the weight coefficient stored in the weight coefficient storage means;

error correction means for correcting the m-bit image signal before the multi-value process, using the

15   weight error calculated by the weight error calculation means;

addition means for adding n-bit information to the 1-n bit image signal multi-valued-processed by the multi-value means, and outputting an 1-bit conversion

20   image signal;

first extraction means for extracting information bits of n bits from the 1-bit conversion image signal output from the addition means; and

second extraction means for extracting image bits

25   of 1-n bits from the 1-bit conversion image signal output from the addition means.

9.   An image processing apparatus wherein a first

processing circuit and a second processing circuit are connected in m bits, the apparatus comprising:

multi-value dithering means for subjecting an m-bit image signal to a multi-value process and converting the m-bit image signal to an m-n bit image signal;

addition means for adding n-bit information to the m-n bit image signal multi-valued-processed by the multi-value dithering means, and outputting an m-bit conversion image signal;

first extraction means for extracting information bits of n bits from the m-bit conversion image signal output from the addition means; and

second extraction means for extracting image bits of m-n bits from the m-bit conversion image signal output from the addition means.

10. An image processing apparatus wherein a first processing circuit and a second processing circuit are connected in m bits, the apparatus comprising:

difference information extraction means for extracting a difference of n-bit additional information of successive two pixels;

replacement means for replacing where the difference extracted by the difference information extraction means is not 0, n bits from lower n+1 bits of an m-bit image signal with additional information, a least significant bit with 1, and also replacing, where

the difference extracted by the difference information
extraction means is 0, the least significant bit with
0, and outputting an m-bit conversion image signal;

error calculation means for calculating an error
between the m-bit conversion image signal replaced by
the replacement means and the m-bit image signal before
the replacement;

an error buffer for storing the error calculated
by the error calculation means;

weight coefficient storage means for prestoring
a weight coefficient for calculating a weight error;

weight error calculation means for calculating
a weight error by multiplying the error stored in the
error buffer by the weight coefficient stored in the
weight coefficient storage means;

error correction means for correcting the m-bit
image signal before the replacement, using the weight
error calculated by the weight error calculation means;
and

extraction means for extracting the lower n bits
of the m-bit conversion image signal replaced and
output from the replacement means.

11. An image processing apparatus wherein a first
processing circuit and a second processing circuit are
connected in m bits, the apparatus comprising:

first replacement bit determination means for
specifying n bits in an m-bit image signal;

replacement means for replacing the n bits specified by the first replacement bit determination means with n-bit additional information, and outputting an m-bit conversion image signal;

5 error calculation means for calculating an error between the m-bit conversion image signal replaced by the replacement means and the m-bit image signal before the replacement;

an error buffer for storing the error calculated

10 by the error calculation means;

weight coefficient storage means for prestoring a weight coefficient for calculating a weight error;

weight error calculation means for calculating a weight error by multiplying the error stored in the

15 error buffer by the weight coefficient stored in the weight coefficient storage means;

error correction means for correcting the m-bit image signal before the replacement, using the weight error calculated by the weight error calculation means;

20 second replacement bit determination means for specifying n bits in the m-bit image signal; and

extraction means for extracting the n bits specified by the second replacement bit determination means from the m-bit conversion image signal output

25 from the replacement means.

12. An image processing apparatus wherein a first processing circuit and a second processing circuit are

connected in m bits, the apparatus comprising:

conversion means for converting n-bit additional information to a random n-bit string;

replacement means for replacing lower n bits of
5 an m-bit image signal with the random n-bit spring converted by the conversion means, and outputting an m-bit conversion image signal;

error calculation means for calculating an error between the m-bit conversion image signal replaced by
10 the replacement means and the m-bit image signal before the replacement;

an error buffer for storing the error calculated by the error calculation means;

weight coefficient storage means for prestoring
15 a weight coefficient for calculating a weight error;

weight error calculation means for calculating a weight error by multiplying the error stored in the error buffer by the weight coefficient stored in the weight coefficient storage means;

20 error correction means for correcting the m-bit image signal before the replacement, using the weight error calculated by the weight error calculation means;

extraction means for extracting lower n bits of the m-bit conversion image signal replaced and output
25 from the replacement means; and

inverse conversion means for subjecting the lower n bits extracted by the extraction means to an inverse

conversion of the conversion by the conversion means.